

What is claimed is:

1. A magnetic recording medium, comprising:
 - a substrate
 - a magnetic recording layer and
 - a caplayer,

wherein the caplayer has been annealed *in situ* at a temperature of from about 150°C to about 550°C.
2. The magnetic recording medium of claim 1, wherein the caplayer comprises CrMn and has a thickness of from about 0.5 nm to about 5 nm.
3. The magnetic recording medium of claim 2, wherein less than about 15 at.% of the caplayer is Cr.
4. The magnetic recording medium of claim 1, wherein Mrt/Hcr is less than about 50 nm.
5. The magnetic recording medium of claim 1, wherein the medium has SMNR of about 5 dB greater than that of another medium except wherein the caplayer of the another medium is not annealed.

6. The magnetic recording medium of claim 2, wherein Mrt/Hcr is less than about 20 nm.

7. The magnetic recording medium of claim 6, wherein the medium has SMNR of about 12 dB or more.

8. The magnetic recording medium of claim 1, wherein the medium has an Mrt of less than about 0.6 memu/cm² and an Hcr of greater than about 2000 kOe.

9. The magnetic recording medium of claim 8, wherein the medium has an Hcr of greater than about 3000 kOe.

10. A method of manufacturing a magnetic recording medium, comprising:
depositing a magnetic recording layer on a substrate,
depositing a caplayer on the magnetic recording layer and
annealing the caplayer *in situ* at a temperature of from about 150°C to about 550°C.

11. The method of claim 10, further comprising depositing a layer comprising CoCrPt on the substrate prior to depositing the caplayer.

12. The method of claim 10, further comprising depositing a protective layer on the caplayer after annealing.

13. The method of claim 10, wherein annealing is carried out at from about 250°C to about 350°C.

14. The method of claim 10, wherein the annealing is carried out for less than about 30 seconds.

15. The method of claim 10, wherein the annealing is carried out for about 14 seconds at a temperature of about 300°C.

16. The method of claim 15, wherein the caplayer has a thickness of from about 0.5 nm to about 5 nm.

17. The method of claim 10, wherein prior to depositing the caplayer on the substrate, the process further comprises:

- depositing a sub-seed layer on the substrate;
- depositing a seed layer on the substrate;
- depositing an underlayer on the seed layer and
- depositing a intermediate layer on the underlayer;

wherein the magnetic layer is deposited on the intermediate layer.

18. The method of claim 17, wherein the magnetic layer comprises at least one of Co, Cr, B, Pt, Ta, and Nb.

19. The method of claim 18, wherein the magnetic layer comprises a layer of CoCrPt having a thickness of from about 100 nm to about 400 nm.

20. A magnetic recording medium, comprising:
a magnetic recording layer and
means for low noise recording.

100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1